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PARAMETERS ANALYZED BY AD8302 CHIP

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ABSTRACT

This paper presents designing a frequency measuring device having wide dynamic range for measuring the characteristics of receiver chain. The need for such a device is the lack of features and the prohibitive expense of similar commercially available devices. It was to create a less expensive, compact, and practical device capable of performing the required tasks. Initial requirements for the device included measuring voltage and current as well as the phase between them and then to output such information to a computer. The serial interface was chosen based on its signal processing capabilities and the relative ease of USB interface implementation to aid in the final product's computer interface. Phase and amplitude are important parameters of RF system.

Keywords- *Receiver, phase, amplitude, RS232*

I. INTRODUCTION

The newly released R F /IF phase detector and gain ratio by chip, AD8302 provides a simple way to measure amplitude log ratio and the phase difference of two RF signals simultaneously [4]. Its features include very few components and a wide dynamic frequency working range. It provides a convenient way to implement simple amplitude and phase detection circuitry for any receiver.

The analog devices circuit AD8302 , which measures gain and phase upto 2.7 GHz, operates with variable level input signals and is less sensitive to both amplitude and frequency fluctuation of the industrial magnetrons than are mixers and AM crystal detectors . Therefore, accurate gain and phase measurements can be performed with low stability generators [5]. A setup with an AD8302 is description of circuit, its performance and proposed scheme as follows.

II. DESCRIPTION OF CHIP

The AD8302 is a fully integrated system for measuring gain/loss and phase in numerous applications. The PCB described in this paper, provides the AD8302 with all the auxiliary components for its proper operation. The PCB is installed into an aluminum box that has been designed to fit with the board dimensions.

The PCB is equipped with two SMA input connectors for the two RF input signals, whose relative gain and phase are to be measured, and two SMA output connectors, named "Vmag" and "Vphs", for the output signals. In "Vmag" there is a voltage proportional to the gain or loss between the two input channels while in "Vphs" the voltage is proportional to the phase difference. The gain or loss and the phase difference between the two input signals can be derived according the following equations given in the AD8302 datasheet

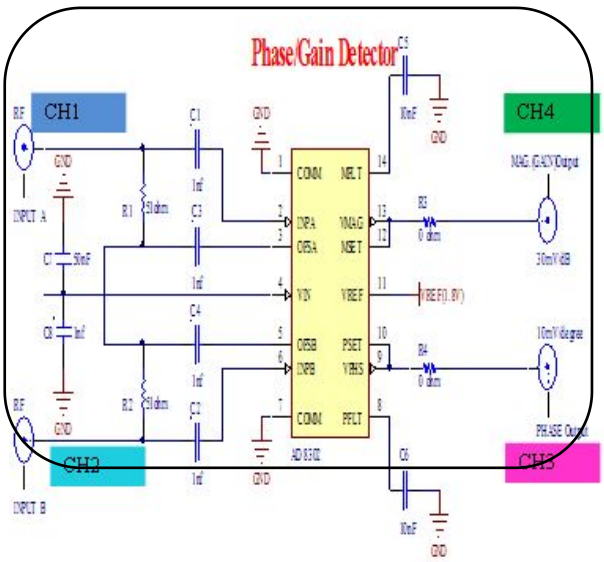

Fig .1 IC circuit diagram

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III. RESULTS

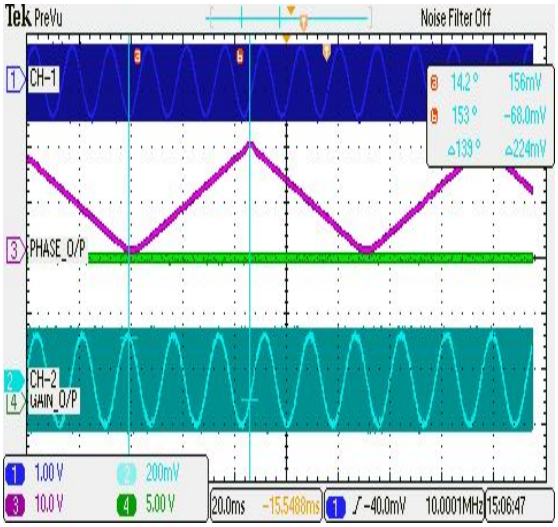

Fig .2 Actual output at DSO

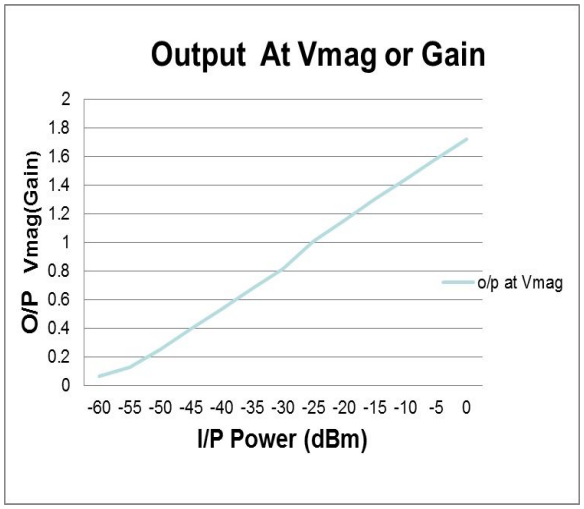

Fig .3 Results are verified as per datasheet

IV. PROBLEM FACED

However, the phase response (Vphs) shows unclear results for the determination of the phase sign. For instance, at 150 MHz, if 1 V is measured at Vphs connector (figure 10), it is not possible to know whether the relative phase is +80º or -80º. For this reason, this circuit could not be used for precious measurements, for example, unless an additional circuit is added, the problem could not be resolved.

V. PROPOSED SCHEME

Therefore we have added ADC and microcontroller to display results and for data analysis on computer interfacing RS 232 introduced.

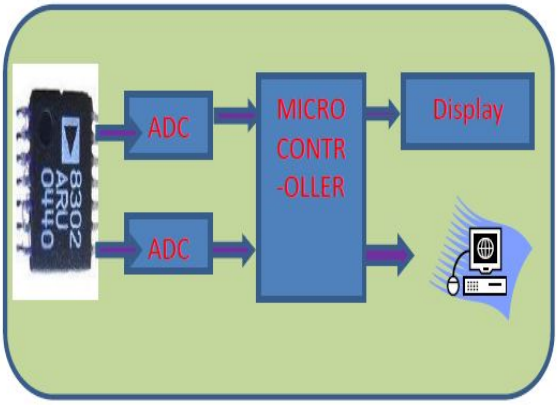

Fig. 4 Proposed *scheme for project*

In first stage, proposed scheme of project tested for two signal generator at local setup. And observed data storing in computer through serial interfacing by RS232 which is shown below.

Table.1. Actual reading measured

Sr. No.	Amp	Phase
1	0	81
2	0	81
3	1	81
4	1	81
5	0	81
6	0	81
7	1	81
8	0	81
9	0	81
10	1	81
11	0	81
12	1	81
13	0	81
14	0	81
15	0	81
16	0	81
17	0	81
18	0	81
19	0	81
20	0	81
21	0	81
22	0	81
23	0	81
24	0	81
25	0	81
26	0	81
27	1	81
28	0	81

Note- Measure reading upto 1000 count as per matlab program

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VI. CONCLUSION

The AD8302 based detector is easy to implement. The detection frequency is up to the 2.7GHz. The detection bandwidth is approximately30MHz, so amplitude and phase variation can be measured on a time scale. The amplitude sensitivity is 30 mV/dB and the phase sensitivity is 10 mV/Degree. These features of the detector satisfy general purpose measurement requirements. This simple amplitude and phase detector have several possible applications, including (1) study of beam transfer functions; (2) monitoring low precision RF parameters; (3) measuring S-band LINAC RF parameters [2]; (4) acting as a simple log-ratio processor for BPM applications, working at the RF frequency. This report implements a simple detector, based upon the AD8302 chip, to measure a various Receiver function.

VII. ACKNOWLEDGEMENTS

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