

DESIGN INPUT DEVICE RECIEVER APLIANCE

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ABSTRACT

In every piece of reconnaissance equipment there is an amplifier at its input whose task is to amplify the received signal to a required level so that it can be further processed. It often happens that an amplifier is damaged due to its high sensitivity to high-power signals. Its active elements often belong to customer circuits and they are not available on the market at the present time. Therefore efforts have been made to propose a new connection that would meet the parameters of the old and which would be feasible with commonly available parts. This is the task being solved in this paper. Result of this work is prototyp of the proposed system.

1 INTRODUCTION

The aim of the paper is to propose a high-frequency amplifier with the required parameters so that it could be replaced by an older one that has been used in receiver technology up to the present time. This amplifier has been realized by the transistor CGY 31. However, it is a customer circuit and thus not available. It was necessary to propose and realize a high-frequency amplifier with the pass band of 0.7 to 2.7 GHz and amplification of minimum 20 dB. The block diagram of the original circuit has been used as a starting point (Fig.1).



Fig. 1: *Block digram*

At the input there is a high-pass filter (HP) with the penetration frequency 700 MHz that is realized by a LC Zobel filter of the 5th order. The next element is the amplifying stage itself that is followed by a low-pass filter (DP) with the penetration frequency 2.7 Ghz realized as a LC Zobel filter of the 8th order. [1].

2 SYSTEM KONCEPTION

While proposing the circuit diagram, the requirements for the particular circuit were taken into consideration. Fig.2 is a original System characteristic with the transistor CGY 31.

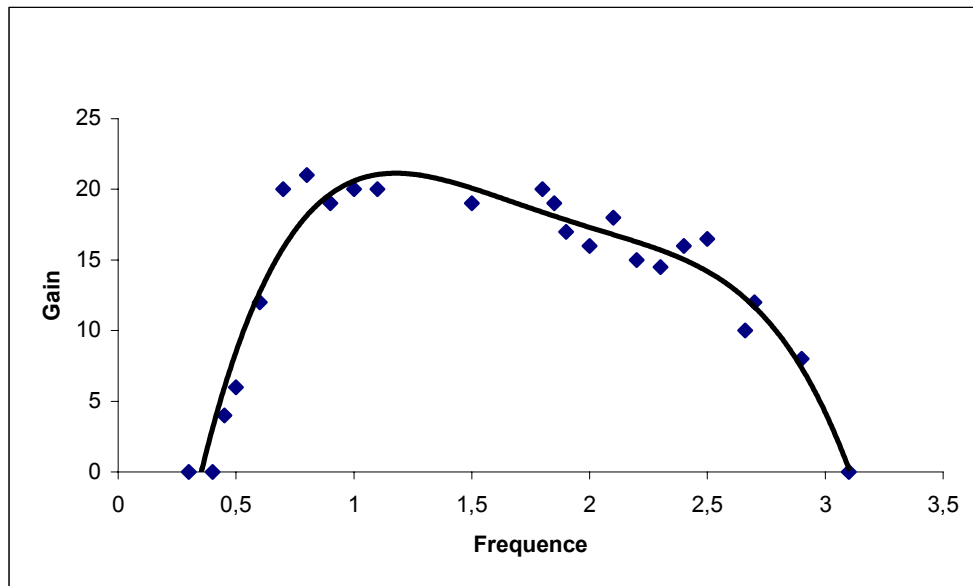


Fig. 2: *Original System Characteristic*

On the basis of these requirements we were looking for a suitable active element (integrated circuits and transistors) in electrical and technical catalogues [2,3]. Eventually, we chose the integrated circuit IVA 14208 according to the given parameters. It is a monolithic, bipolar, high-frequency amplifier with a band width of 2.5 GHz.

The calculation of filters at UHF, L and S band is difficult. By means of the available software equipment (NAF) we have obtained the connection of filters that is shown in enclosures. Fig.3 is a functional diagram of the amplifier connection.

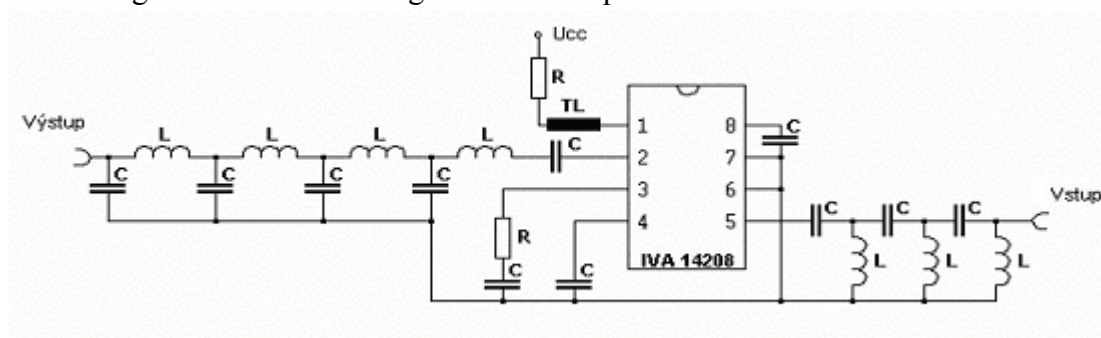


Fig. 3: *Functional diagram*

3 SYSTEM CONSTRUCTION AND DESIGN

According to the previous chapter and the connection of the integrated circuit IVA 14208, a printed circuit board has been proposed.

Resistors and capacitors in the construction implementation of SMD met the requirements from the standpoint of their behavior under high frequencies in the best way and that is why they were also used in the connection. The connection is placed in an aluminum box in order to be protected against any interference. Perfect grounding appeared to be the most important condition. The printed circuit board is double-sided for the sake of the best possible grounding. It is shown in enclosures. (enclosure).

4 RESULTS OF MEASUREMENTS

The aim of the work was to propose and realize a substitute for the input unit of a piece of receiving equipment under the condition that the requirements would be met, especially those related to the amplification and band being transmitted. The aim has been achieved. The amplification of the whole receiving equipment creates up to 30 dB. Measurement [4,5] has disclosed that the original input element with the circuit CGY 31 produced amplification in the range of 18 - 22 dB, while the proposed input element with the circuit IVA 14208 has an amplification within the interval of 20 - 22 dB and top performance can even achieve 27 dB. The band width is the same as it was in the original connection, which was also the aim of the work. It is true that the proposed connection also works in higher frequencies but the following circuits in the receiving equipment filter these frequencies off. Thus, no problem arises if the given connection works above the defined frequency band. Restriction of the frequency band to its upper penetration frequency is only a matter of fine tuning the low-pass filter.

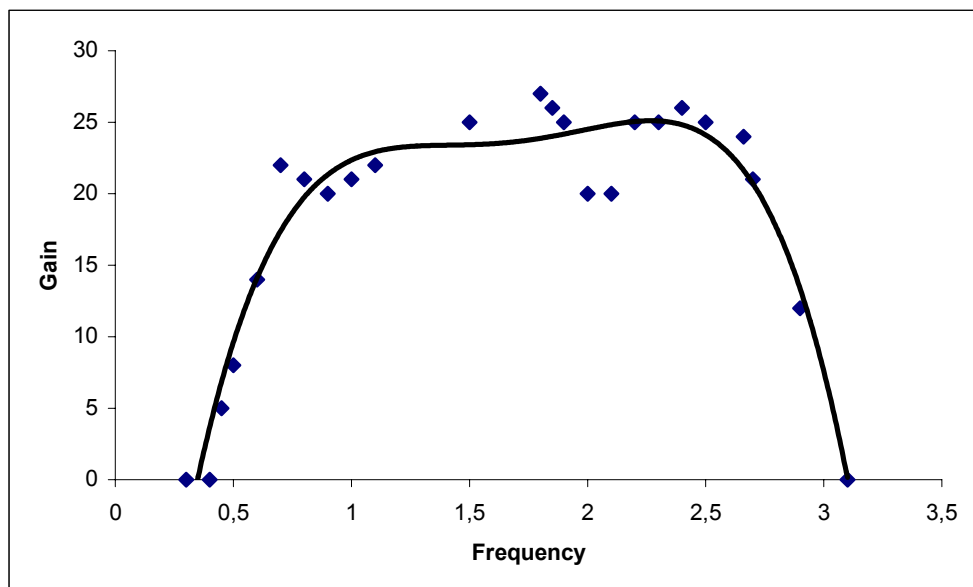


Fig. 4: *Proposed System Characteristic*

5 CONCLUSION

For a consideration this work in the possibility of using the receiving equipment even after failure of the original input unit has occurred. There is no need to buy new receiving equipment, which can be very expensive. The results of this work are already apply to practice. The designed device is working very reliable and in some parameters show better results, than original one.

REFERENCES

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- [5] KLESŇ, B.: Merania v rádiotechnike, Bratislava ,Nakladateľstvo Alfa, 1968

REGISTER ENCLOSURES

- Enclosure 1 Proposal of printed circuit
- Enclosure 2 Realization of input unit with IVA 14208
- Enclosure 3 Workplace connection
- Enclosure 4 Transmission characteristics of input unit with IVA 14208