A Two Channels I/Q-Demodulator

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Abstract – **In this article are analyzed one-cascade and multicascade I/Q-demodulators with two channels.**

Keywords - **I/Q-demodulator, analog-to-digital convertor (ADC), amplitude-frequency response (AFR).**

I. Introduction

Formation quadrature making OFDM signals at their reception is expedient for combining with the preliminary frequency selection, allowing to provide additional noise immunity of a communication channel. In the report the two-channel variant of the I/Q-demodulator effectively realizing a combination of specified functions is offered.

II. Main Text

Provided that on I/Q-demodulator inputs digital readout of signals from exits quadrature analog-digital converters arrive, the block diagram of an one-cascade variant of the I/Q-demodulator is presented on fig. 1. Thus as module I/Q-demodulator in everyone quadrature the channel the device [1] is used, and the target signal is formed according to expressions:

$$C = U1^c + U2^s \text{ и } S = U1^s - U2^c. \quad (1)$$

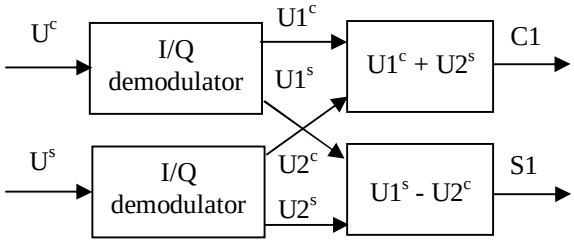

Fig. 1. The block diagram of the one-cascade The I/Q-demodulator

Results of calculation of the peak-frequency characteristic (AFR) the one-cascade I/Q-demodulator (fig. 1) for 8- and 16-readouts of measuring options are shown in fig. 2. Methods of calculating the coefficients for the 16-readouts I/Q-demodulator is given in [2]. At the same sets of coefficients are used for one independent variable (C = 1) and two independent variables (option 2).

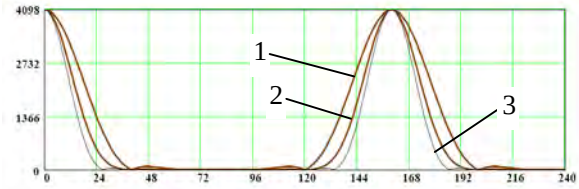

Fig. 2. AFR the two-channel I/Q-demodulator :

1) 8-readouts reference filter (a = C, b = 11C, c = 15C, d = 5C, C = 1) [1], 2) 16-readouts reference filter option on the basis of calculation of the 8- readouts filter (a = C, b = 79C, c = 793C, d = 2431C, e = 3003C, f = 1573C, g = 299C, h = 13C, C = 1) [2], 3) 16-readouts reference filter, second version (a = 1, b = 46, c = 265, d = 550, e = 627, f = 418, g = 131, h = 10) [2]

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On fig. 3 in logarithmic scale are shown AFR the I/Q-demodulators, presented on fig. 2.

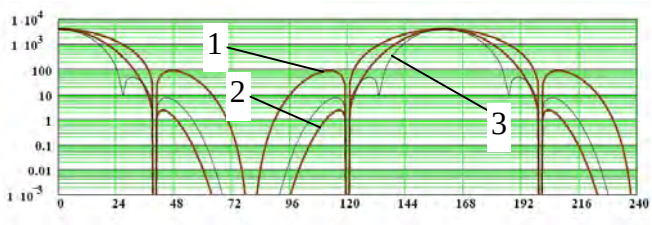

Fig. 3. The logarithmic scale AFR, presented on fig. 2.

For increase of frequency selectivity of procedure of I/Q-demodulation it is necessary to use multicascade inclusion of I/Q-demodulators. The principle of formation of multicascade schemes of demodulation is explained on fig. 4 on an example of two-cascade inclusion of I/Q-demodulators.

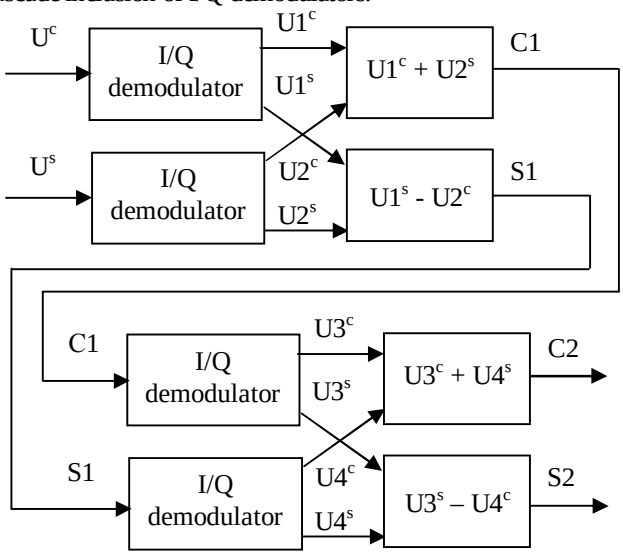

Fig. 4. The two-cascade scheme of the I/Q-demodulator

III. Conclusion

Use of multicascade inclusion allows decrease dimension of I/Q-demodulators for achievement of the set level of noise immunity, and also to lower a dynamic range of weight factors.

References

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[2] Slyusar V.I., Maljarchuk M.V, Bondarenko M.V.Metodika of synthesis of I/Q-demodulators any dimension.//II I-й International scientific-techncal symposium "New the technologist in telicomunication" (DUIKT- KARPATU ' 2010, with. Vushkiv). – Kiev: National Universety Information-Telecomunication technologe. - 2-5 february 2010.-pp.53-55. http://www.slyusar.kiev.ua/VYSHKIV_2010_2.pdf.