

HF SDR S/H Sample and Hold Receiver DR2E (Modification of DR2 with new Audio Instrumental Amplifiers) from 30 KHz to 35 MHz-Make it Simple as Possible with Outstanding Performances

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I read a lot of comments related to my SDR designs. I must admit that some comments were OK. One of these was that my post S/H detectors amplifiers are not optimal designs, comments from Vytautas LY3BG at SDR forum ref 3. If you read article from Gerald AC5OG you will realize that for the HF even to 50 MHz receiver NF (noise figure) is not so important performances like dynamic range. Of course it is very nice if it is possible to achieve all in one design. Every design is some kind of compromise. It is very hard to fulfill all that in one design especially if it is as simple as mine. I was aware of the situation from the beginning. The overall feedback at OP AMP also is against better NF and in all designs I have very strong negative feedback to reduce OP AMP gain. This problem and how to solve it I will explain in the SDR RXs for VHF and UHF bands. In short, the solution is using of instrumental audio OP AMP connection. AC5OG Gerald is using in his famous SDR1000 transceiver this way. Very good instrumental OP AMP is laser trimmed for good CMRR like INA163...and it is not so cheap. I made this kind of instrumental OP AMP with 3 OP AMP from NE5532 (for VHF and UHF bands I am using better OP AMP very expensive "state of the art" AD797).

Practically I pasted DR2 input circuit S/H detector to the audio instrumental OP AMP realization with NE5532 used in SDR AR1, AR2 VHF and UHF receivers with 6 wires. The results were as I had been expecting from this kind of circuit. The benefits are:

1. Better MDS, according to my calculation must be 5 dB better. Practically I achieved 3 dB improvements results are very sensitive to the setting in SDR software.
2. Better CMRR (common mode ripple rejection- rejection in phase signals at OP AMP inputs), 30-40 dB was typical values for ordinary DR2 now it is in the case DR2E between 40-50 dB.

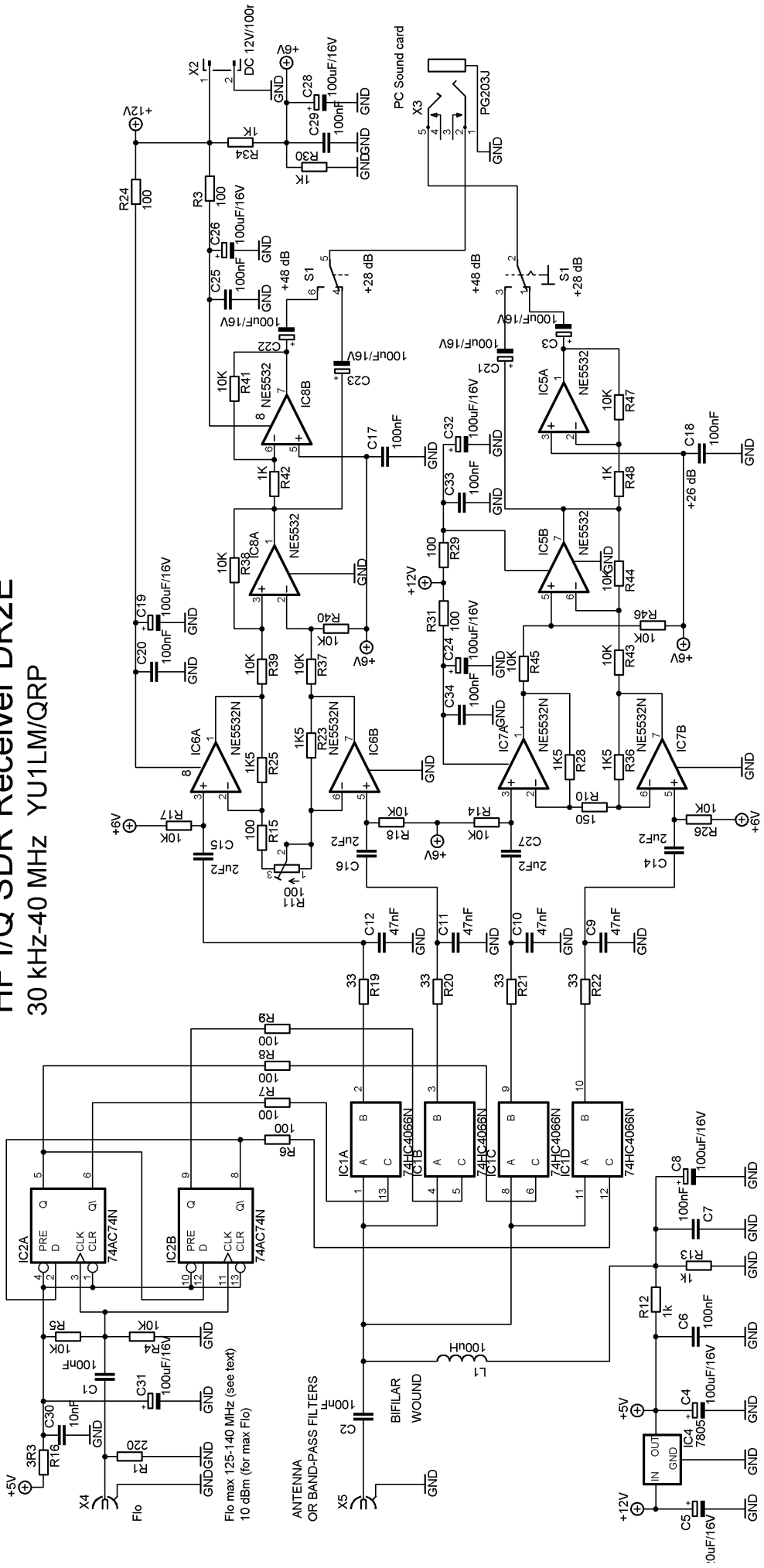
Positive side of this design has negative side too. Negative aspects are more hardware and circuit is not simple as previously.

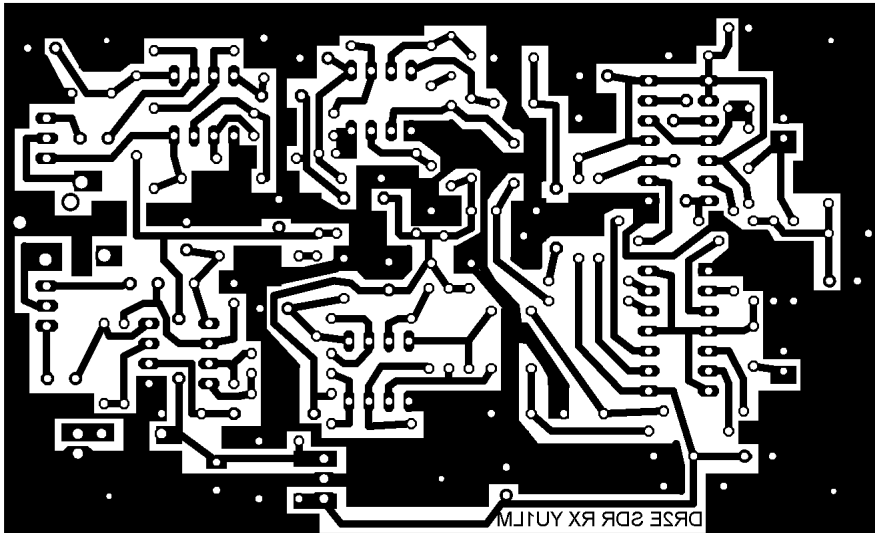
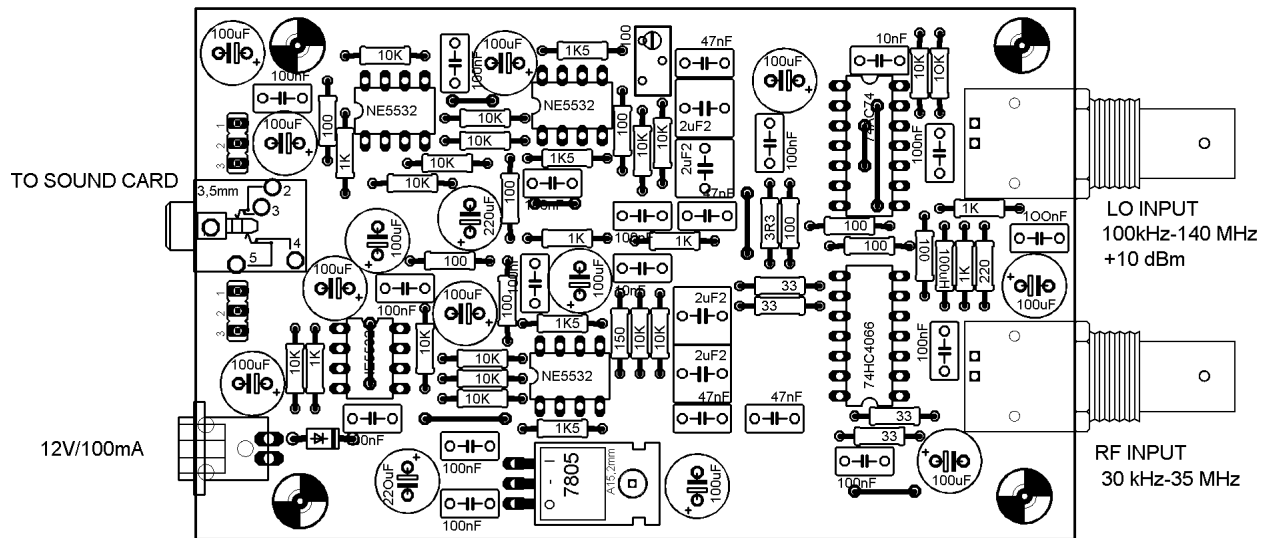
All other specifications are the same as they were for DR2 only DR2E has 1-2 DR (dynamic range) improvement and optimal virtual ground $V_{cc}/2$ at +6 V for OP AMPs to use full possible output voltage swing 10Vp-p. We can obtain 1 dB in DR more with power supply VCC +15 V !!

I didn't make this DR2E PCB yet but I tested this circuits and I don't expect any problem because circuit DR2E with wire connections was working very well.

HF I/Q SDR Receiver DR2E

30 KHZ-40 MHz YU1LM/QRP





DR2E single side PCB dimensions 112 x 68 mm

I made great effort to make SDR projects and share them with all who are interesting for. Anyway send me your comments positive or negative, results or photos of your realization please.

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References:

1. www.qsl.net/yu1lm/homebrew, www.yu1lm.qrpradio.com
2. <http://forum.cqham.ru/viewforum.php?f=28>
3. <http://translate.google.com/translate?hl=en&sl=ru&u=http://forum.qrz.ru/showthread.php%3Fp%3D107903&sa=X&oi=translate&resnum=9&ct=result&prev=/search%3Fq%3Dyu1lm%2B%3D%26hl%3Den%26lr%3D%26sa%3DG>
4. <http://translate.google.com/translate?hl=en&sl=ru&u=http://forum.cqham.ru/viewtopic.php%3Fp%3D105931&sa=X&oi=translate&resnum=10&ct=result&prev=/search%3Fq%3Dyu1lm%2B%3D%26start%3D10%26hl%3Den%26lr%3D%26sa%3DN>
5. Skidan@mail.ints.net T03DSP UR3IQO <http://users.ints.net/skidan/T03DSP>
6. <http://www.nitehawk.com/sm5bsz> Leif LINARD
7. <http://www.flex-radio.com> SDR1000 Gerald AC5OG
8. <http://www.njgrp.org/mbrproj/9850dds.html>
www.analog.com/en/prod/0,,770_843_AD9850,00.html
<http://www.qsl.net/pa3ckr/signalgenerator/>
http://www.k6ese.com/DDS_Project.htm
http://ham.kiev.ua/pic/dds_ham2.html
<http://www.qsl.net/om3cph/dds/rx.html>
<http://www.seboldt.net/k0jd/othervfo.html>
<http://perso.wanadoo.fr/f6ity/p2063001.htm>
<http://koti.netplaza.fi/~jonverro/ad9854.htm>
<http://www.labyrinth.net.au/~steve/freq/>
<http://members.aol.com/DI4JAL/DDS.html>
<http://hem.passagen.se/communication/dds.html>
9. *Recent Advances in Shortwave Receiver Design* Dr. Ulrich Rohde *QST* Nov 1992 page 53
6. *RF Design* 6/1995

Software LINK for SDR radio receiving and transmitting

1. www.weaksignals.com Alberto I2PHD SDRadio software ver 0.99
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8. dl6iak.ba-karlsruhe.de