$D := \mathrm{READBMP}(\mathrm{xes\_op32\_137561\_2313\_0616}_{bmp})$ $nxm := \mathrm{spalten}(D)$ $nx := 0..nxm-1$ $nym := \mathrm{zeilen}(D)$ $ny := 0..nym-1$

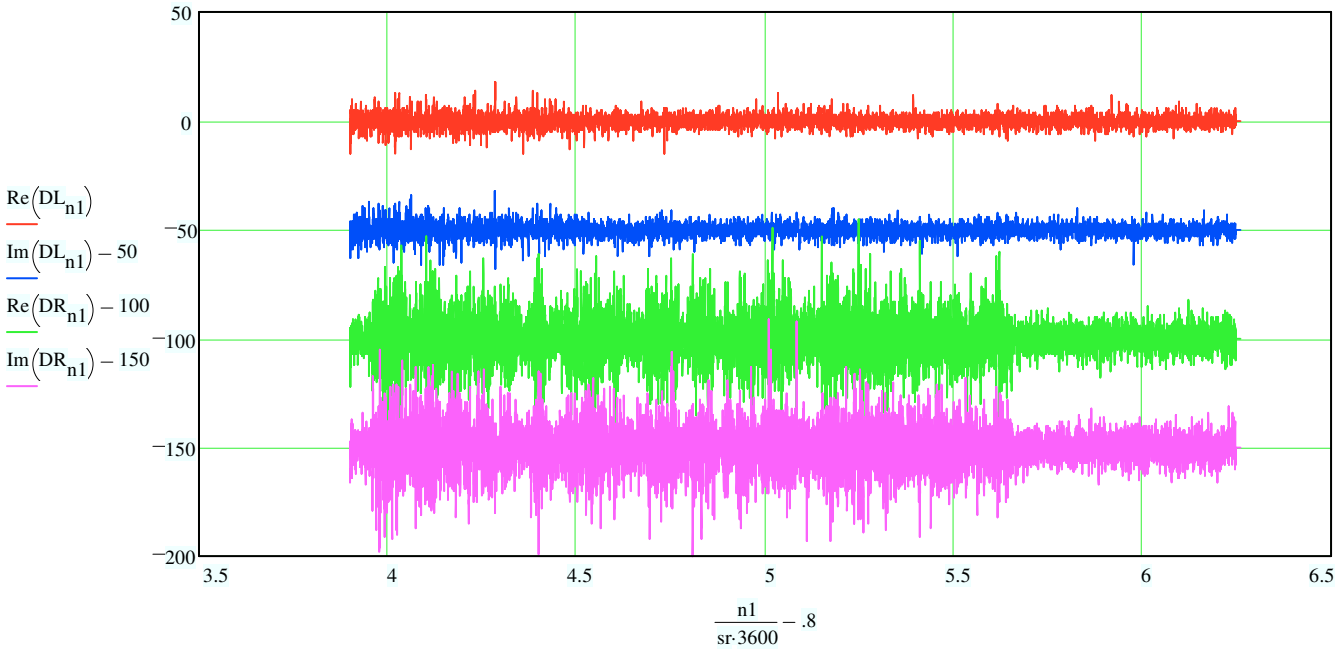
$D2_{nym\cdot nxm-1} := 0$ $D2_{ny\cdot nxm+nx} := D_{nym-ny-1,nx}$ $s128(x) := \mathrm{wenn}(x<128, x, x-256)$

$nm := \frac{\mathrm{zeilen}(D)\cdot\mathrm{spalten}(D)}{8}$ $n := 0..nm-1$ $sr := \frac{12000}{6144}$ $\frac{nm}{sr} = 25427.968$

$DL_n := D2_{8\cdot n} + 256\cdot s128(D2_{8\cdot n+1}) + j\cdot(D2_{8\cdot n+2} + 256\cdot s128(D2_{8\cdot n+3}))$

$DR_n := D2_{8\cdot n+4} + 256\cdot s128(D2_{8\cdot n+5}) + j\cdot(D2_{8\cdot n+6} + 256\cdot s128(D2_{8\cdot n+7}))$

$nst := \mathrm{floor}((3.9+.8)\cdot sr\cdot 3600)$ $n1 := nst..nst+1000$ $n1 := nst..nm-1$



$nfm := \frac{4096}{4}$ $nf := 0..nfm-1$ $nsm := \mathrm{floor}\left(\frac{nm}{nfm}\cdot 2-1\right)$ $nsm = 96$ $ns := 0..nsm-1$

$BL_{nf,ns} := DL_{ns\cdot\frac{nfm}{2}+nf}$ $win_{nf} := 2\cdot\sin\left(\frac{nf}{nfm}\cdot\pi\right)^2\cdot(-1)^{nf}$ $SL_{nfm-1,nsm-1} := 0$ $SL^{\langle ns\rangle} := \mathrm{CSFT}\left(\overrightarrow{\left(BL^{\langle ns\rangle}\cdot win\right)}\right)$

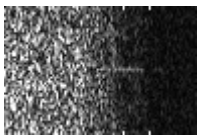
$nfdm := 64$ $nfdc := \mathrm{floor}(nfm\cdot .5988)$ $nfd1 := nfdc - \frac{nfdm}{2}$ $nfd := 0..nfdm-1$ $nfdc = 613$

$\mathrm{lim}(x) := \mathrm{if}(x>1, 1, x)$ $sc := .5$ $SLd_{nfd,ns} := \mathrm{lim}\left(\left|SL_{nfd1+nfd,ns}\cdot sc\right|\right)\cdot 255$

$nsd1 := \mathrm{floor}\left[(3.5+.8)\cdot 3600\cdot sr\cdot\frac{2}{nfm}\right]$ $nsd2 := \mathrm{floor}\left[(4.5+.8)\cdot 3600\cdot sr\cdot\frac{2}{nfm}\right]$

$nfdd := 0..1$ $SLd_{nfdd,nsd1} := 255$ $SLd_{nfdd,nsd2} := 255$ $SLd_{nfdm-nfdd-1,nsd1} := 255$ $SLd_{nfdm-nfdd-1,nsd2} := 255$

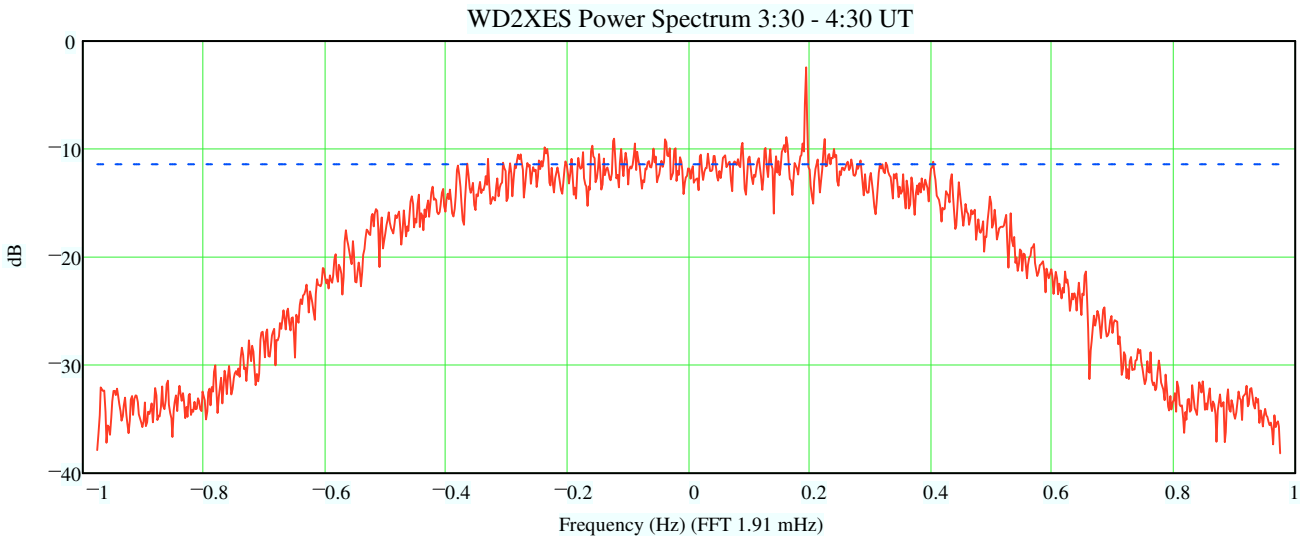
Spectrogram

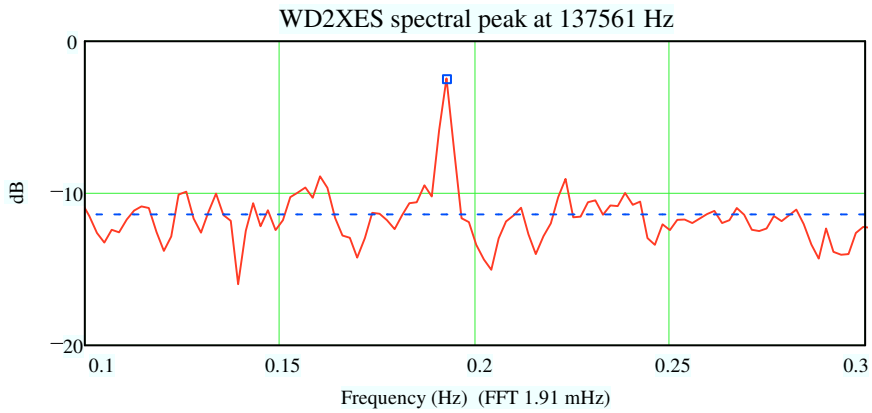


$\mathrm{WRITEBMP}(\mathrm{Spectrogram}_{bmp}) := SLd$

$$dB(x) := if(|x| < .00001, -100, 20 \cdot \log(|x|))$$

$$Sav := \overrightarrow{\sqrt{\frac{1}{nsd2 - nsd1 + 1} \cdot \sum_{na = nsd1}^{nsd2} \left(\left|\overrightarrow{SL^{<na>}}\right|\right)^2}} \qquad sav := \sqrt{\frac{1}{nfm \cdot .25} \cdot \sum_{na = nfm \cdot .375}^{nfm \cdot .625 - 1} \left(Sav_{na}\right)^2} \qquad nsd2 - nsd1 + 1 = 14$$





SNR of central line $dB\left(\frac{\max(Sav)}{sav}\right) = 8.954$ dB in $\frac{sr}{nfm} \cdot 1000 = 1.907$ mHz FFT

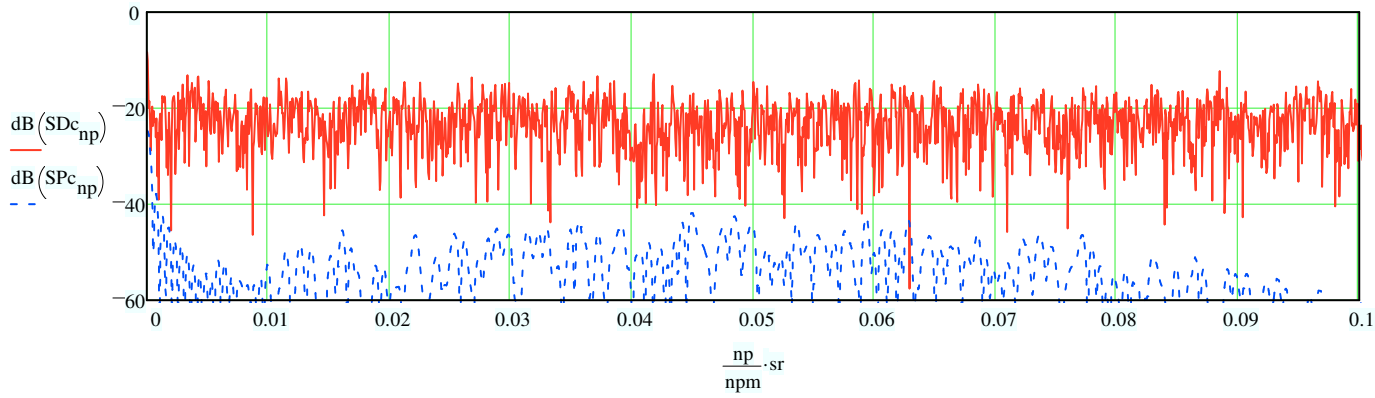
Opera SNR scale $dB\left(\frac{\max(Sav)}{sav}\right) + dB\left(\sqrt{\frac{sr}{nfm} \cdot 1.5 \cdot \frac{1}{2500}}\right) + 6 - 4 = -48.46$

correlation

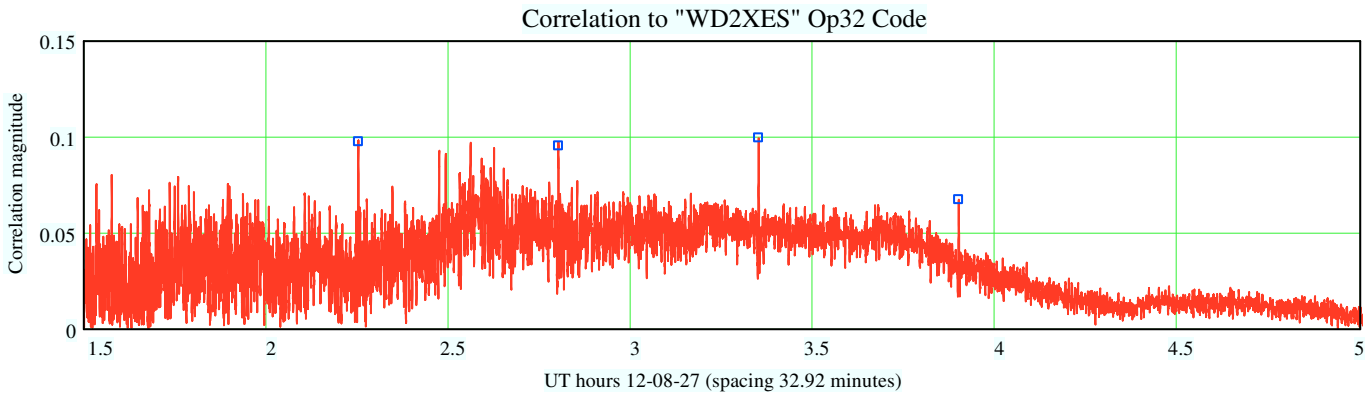
$Op := READPRN(wd2xes_{txt})^T$ $bittime := 32 \cdot .256$ $npm := 256 \cdot 16 \cdot 8$ $np := 0 .. npm - 1$

$rows(Op) = 239$ $Op_{floor\left(\frac{npm-1}{sr \cdot bittime}\right)} := 0$ $rows(Op) = 2048$ $Pc_{np} := Op_{floor\left(\frac{np}{sr \cdot bittime}\right)}$ $SPc := CFFT(Pc)$ $SPc_0 := 0$

$nt1 := floor((1.1 + .8) \cdot 3600 \cdot sr)$ $f0 := .1926$ $Dc_{np} := DL_{nt1+np} \cdot exp\left(-2j \cdot \pi \cdot \frac{f0}{sr} \cdot np\right)$ $SDc := CFFT(Dc)$



$Cc := ICFFT\left(\overrightarrow{\left(SDc \cdot \overline{SPc}\right)}\right)$ $npp := 0 .. 3$ $dpp := 3858$ $nppp_{npp} := 19675 - dpp \cdot npp$ $\frac{dpp}{sr \cdot 60} = 32.922$



$Op2 := READPRN(wd2xgj_{txt})^T$ $Op2_{floor\left(\frac{npm-1}{sr \cdot bittime}\right)} := 0$ $Pc2_{np} := Op2_{floor\left(\frac{np}{sr \cdot bittime}\right)}$ $SPc2 := CFFT(Pc2)$ $Cc2 := ICFFT\left(\overrightarrow{\left(SDc \cdot \overline{SPc2}\right)}\right)$